

## Claims

- [c1] 1.A sub-reflector assembly for a reflector antenna with a waveguide supported sub-reflector, comprising:  
a dielectric block;  
the dielectric block having a first diameter waveguide junction portion adapted for coupling to an end of the waveguide;  
a sub-reflector surface coated with an RF reflective material having a periphery at a second diameter larger than the first diameter; and  
a leading cone surface extending from the waveguide junction portion to the second diameter at an angle;  
the sub-reflector surface and the leading cone surface having a plurality of non-periodic perturbations concentric about a longitudinal axis of the dielectric block.
- [c2] 2.The assembly of claim 1, wherein the perturbations include ridges and or grooves of varied width and height.
- [c3] 3.The assembly of claim 1, wherein the waveguide junction portion coupling is via insertion into an end of the waveguide.
- [c4] 4.The assembly of claim 1, wherein the waveguide junc-

tion portion has at least one groove and at least one step.

- [c5] 5.The assembly of claim 1, further including at least one radial corrugation in the periphery.
- [c6] 6.The assembly of claim 1, wherein the angle is a first angle between the waveguide junction portion and a first location along the leading cone surface and a second angle from the first location to the periphery.
- [c7] 7.The assembly of claim 1, wherein the perturbations are adapted to create a desired phase correction to a radiation pattern of the sub-reflector.
- [c8] 8.The assembly of claim 1, wherein the perturbations are adapted to create a desired amplitude correction to a radiation pattern of the sub-reflector.
- [c9] 9.The assembly of claim 1, wherein the perturbations are adapted to create a desired radiation pattern that is different between a vertical and a horizontal polarized portion of the radiation pattern.
- [c10] 10.The assembly of claim 1, wherein the perturbations are adapted to enable a desired radiation pattern over a range of frequencies, when the sub-reflector is mated with a single deep dish reflector configuration.
- [c11] 11.The assembly of claim 1, wherein the range of fre-